



IFW

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q95169

Koji KUDO, et al.

Appln. No.: 10/580,560

Group Art Unit: Not Yet Assigned

Confirmation No.: Not Yet Assigned

Examiner: Not Yet Assigned

Filed: May 26, 2006

For: DISTRIBUTED-FEEDBACK SEMICONDUCTOR LASER, DISTRIBUTED-FEEDBACK SEMICONDUCTOR LASER ARRAY, AND OPTICAL MODULE

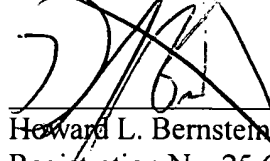
SUBMISSION OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

For the Examiner's convenience, enclosed herewith is a copy of the English translation of the International Preliminary Report on Patentability (IPRP). It is assumed that copies of the cited references as required by §371(c) will be supplied directly by the International Bureau, but if further copies are needed, the undersigned will undertake to provide them upon request.

Respectfully submitted,


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WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: January 24, 2007

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF TRANSMITTAL
OF COPIES OF TRANSLATION
OF THE INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY
(CHAPTER I OR CHAPTER II
OF THE PATENT COOPERATION TREATY)
(PCT Rules 44bis.3(c) and 72.2)

To:

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Date of mailing (day/month/year) 31 August 2006 (31.08.2006)	
Applicant's or agent's file reference NEG-414PCT	IMPORTANT NOTIFICATION
International application No. PCT/JP2004/016838	International filing date (day/month/year) 12 November 2004 (12.11.2004)
Applicant NEC CORPORATION et al	

1. Transmittal of the translation to the applicant.☐

The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).

☒

The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

EP, KR

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Yoshiko Kuwahara
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TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NEG-414PCT	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/JP2004/016838	International filing date (day/month/year) 12.11.2004	Priority date (day/month/year) 28.11.2003
International Patent Classification (IPC) or national classification and IPC H01S5/12		
Applicant NEC CORPORATION		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a. ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:

☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒ Box No. I Basis of the report

☐ Box No. II Priority

☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

☐ Box No. IV Lack of unity of invention

☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

☐ Box No. VI Certain documents cited

☐ Box No. VII Certain defects in the international application

☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/016838

Box No. 1

Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following _____ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-29, 31 _____ as originally filed/furnished
- pages* 30 _____ received by this Authority on 24.05.2005
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. 1-17 _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* 21 _____ received by this Authority on 24.05.2005
- nos.* _____ received by this Authority on _____
- ☒ the drawings:
- sheets 1-18 _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description: pages _____
- ☒ the claims, nos. 18-20, 22 _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/016838

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1-17, 21</u>	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	<u>1-17, 21</u>	NO
Industrial applicability (IA)	Claims	<u>1-17, 21</u>	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
<p>Document 1: Itaya Y. et al., "Law Threshold Current GaInAsP/InP DFB Lasers", In: IEEE Journal of Quantum Electronics, Vol. QE-23, No. 6, June 1987, pages 828 to 834</p> <p>The invention set forth in claims 1 to 3 does not involve an inventive step in the light of document 1 cited in the international search report. Document 1 indicates that an antireflective (AR) surface with a reflectance of 1% is made to serve as the light-emitting surface side of a distributed-feedback semiconductor laser (hereinafter referred to as a "DFB laser"), while a reflective surface (HR) surface with a reflectance of 80% is made to serve as the opposite side; and that a good single vertical mode is obtained by setting the coupling coefficient to 100cm^{-1} and the length of the gain area to $100\mu\text{m}$.</p> <p>Meanwhile, $\Delta\alpha/\text{gth}$ is also influenced by parameters other than the coupling coefficient of the diffraction grating and the length of the gain generating area, and cannot be directly controlled by a person skilled in the art when designing a distributed-feedback semiconductor laser, and as stated by the applicant in the description,</p>			

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/016838

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

$\Delta\alpha/g_{th}$ is if anything understood to be a indicator of single mode stability. Therefore the stipulation that a combination of κ and L are used to make $\Delta\alpha/g_{th}$ at least 1 is understood to indicate the performance of a resultant state in which single mode stability (SMSR value) is good. Therefore this stipulation merely involves adding a feature whereby the generally desirable performance of a high SMSR is represented by other parameters, and it would be easy for a person skilled in the art to conceive of said stipulation.

Document 2: US 4740987 A (McCall Jr. et al.), 26 April 1988, column 2, lines 49 to 61, column 4, lines 28 to 37 & JP 63-027089 A & CA 1277756 A

Document 3: US 4796273 A (Yamaguchi, M.), 3 January 1987, column 3, lines 38 to 54 & DE 3681052 A & EP 195425 A2 & JP 61-216383 A

The invention set forth in claims 4 and 5 does not involve an inventive step in the light of documents 1 to 3 cited in the international search report. Documents 2 and 3 are understood to indicate that in order to obtain a good single mode, the $\lambda/4$ shift part of a diffraction grating provided to a DFB laser is formed at a position of $75\% \pm 5\%$ from the light-emitting surface having a low reflectance, therefore it would be easy for a person skilled in the art to employ the known feature set forth in documents 2 and 3 in the invention set forth in document 1.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/016838

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability:
citations and explanations supporting such statement

Document 4: US 2003/0021319 A1 (Aoki, M), 30 January
2003, paragraphs [0026] and [0027]; fig. 2,
3 & JP 2003-046190 A

The inventions set forth in claims 6 to 8, 10 and 15 do not involve an inventive step in the light of documents 1 to 4 cited in the international search report. Document 4 is understood to indicate that the rear surface of a short gain area semiconductor laser is formed by etching, and that the photo diode and etching mirror on the aforementioned rear surface side are formed monolithically, therefore it would be easy for a person skilled in the art to apply the feature set forth in document 4 to the invention set forth in document 1, which has a short gain area and wherein the rear surface is formed by etching. In addition, it would be easy for a person skilled in the art to set the series resistance of the laser element to $50\Omega \pm 10\Omega$ in the invention set forth in document 1, in the light of the fact that it is obvious that series resistance would increase as the gain area becomes shorter, as disclosed in document 4.

Document 5: JP 63-080590 A (Nippon Telegraph and Telephone Corporation), 11 April 1988, page 4, upper left column, line 6 to upper right column, line 24 (Family: none)

The invention set forth in claims 7 to 9 does not involve an inventive step in the light of documents 1 to 3 and 5 cited in the international search report. Document 5 is understood to indicate that the rear

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/016838

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

surface of a semiconductor laser is formed by etching, and that on the aforementioned rear side, a photodiode having a sloped light-receiving surface is formed monolithically, therefore it would be easy for a person skilled in the art to apply the aforementioned feature set forth in document 5 to the invention set forth in document 1, which is similarly formed by etching on the rear surface.

Document 6: JP 03-283483 A (Mitsubishi Electric Corporation), 13 December 1991, claims (Family: none)

Document 7: JP 62-112391 A (Nippon Telegraph and Telephone Corporation), 23 May 1987, page 3, upper right column, lines 6 to 18; fig. 3 and 4 (Family: none)

The invention set forth in claim 11 does not involve an inventive step in the light of documents 1 to 7 cited in the international search report. A DFB laser, having one end surface with a low reflectance and the other end with a high reflectance, wherein the reflectance of the other end is set to at least 90%, is a known technique, as set forth in documents 6 and 7, and it would be easy for a person skilled in the art to apply said feature to the invention set forth in document 1.

Document 8: JP 2002-198611 A (Seiko Epson Corporation), 12 July 2002, claims 1, 2 and 4 (Family: none)

The invention set forth in claims 12 and 13 does not

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/016838

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability:
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involve an inventive step in the light of documents 1 to 8 cited in the international search report. A semiconductor laser, wherein a hole is made in part of the highly reflective film on one end, and monitor light is drawn through this hole to a photodiode, is disclosed in document 8, and it is a known technique in said technical field to monitor laser light using a photodiode, therefore it would be easy for a person skilled in the art to apply the feature set forth in document 8 to the invention set forth in document 1.

Document 9: Nakahara K. et al., "115°C, 12.5-Gb/s direct modulation of 1.3- μm InGaAlAs-MQW RWG DFB laser with notch-free grating structure for data com applications", OFC2003 PD40-1 - PD40-3

The invention set forth in claim 14 does not involve an inventive step in the light of documents 1 to 9 cited in the international search report. A semiconductor laser, wherein a material containing aluminum, nitrogen, or antimony is employed as a material which constitutes a gain-generating area, is merely a known feature, as set forth in documents 4 and 9, and it would be easy for a person skilled in the art to apply the aforementioned known feature to the invention set forth in document 1.

Document 10: US 2002/0159705 A1 (Naniwae, K), 31 October 2002, claim 5, fig. 2 & JP 2002-323628 A

The invention set forth in claims 16 and 17 does not

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/016838

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability:
citations and explanations supporting such statement

involve an inventive step in the light of documents 1 to 10 cited in the international search report. Document 10 sets forth a multiple wavelength monolithic laser array and optical module integrating a DFP laser and AWG on a single substrate, and it would not be difficult for a person skilled in the art to constitute the invention set forth in document 1 as a monolithic array or optical module, as set forth in document 10.